1. **You should be thoroughly familiar with the following topics from undergraduate linear algebra**:

   - vectors, vector spaces, subspaces
   - linear independence, basis, dimension
   - matrices and linear transformations
   - rowspace, columnspace(range), nullspace(kernel), left nullspace
   - rank and invertibility of a matrix
   - linear systems, LU decomposition of a matrix, and its relation to Gaussian elimination
   - dot product of vectors, orthogonality
   - eigenvalues, eigenvectors and similarity transformations

   Please review these topics if you are rusty.

2. **Numerical experimentation is an integral part of the course**. Its goal is to reinforce and reflect theory, compare and contrast theory with practise, and make numerical and theoretical conjectures. Here are some tips on what makes a good solution to a problem involving numerical computation.

   (a) Describe the design of your experiment. If you are comparing method A with method B, consider comparing the performance (for example, in terms of efficiency and accuracy) of each of the methods against a standard benchmark. A benchmark could be the exact solution computed by analytical (rather than numerical) means, or it could be a different method (which could be a built-in MATLAB function).

   (b) Describe the test data, and why you chose it. Do the same for any other design parameters.

   (c) Organize your output in a compact and readable fashion. Use `format compact` to suppress unnecessary line feeds. Calculate relative errors if appropriate; summarize results in a table.

   (d) Annotate your output (by hand is ok, and even preferable at times!). Comment your code.

   (e) Do not submit reams of numerical output. This will almost certainly earn you negative credit. When appropriate, plot your numerical output. Learn about MATLAB's `subplot` command.

   (f) What do you observe? What does the output suggest? Can you explain your observations?

   (g) What conclusions can you draw from your experiments? Why? How does theory compare with practise? For example, how do the mathematically exact solutions compare with the numerical ones? Or, can you prove by analytical means the patterns you've observed or been led to conjecture by numerical means?

   (h) Does your experiment suggest directions for further exploration? New conjectures? Generalizations? Include any progress made on such investigations. You are encouraged to extend exercises in this manner, and carry out your own on-going investigations during the semester.